REMARKS

The Final Office Action of May 6, 2004, and the Advisory Action of August 5, 2004, have been received and reviewed.

Claims 23-27 and 29-64 are currently pending and under consideration in the above-referenced application, each standing rejected.

Reconsideration of the above-referenced application is respectfully requested.

Rejections Under 35 U.S.C. § 102(b)

Claims 23, 24, 29, 30, 33, 40, 45, 46, 49, 50, 53, 59, and 61-64 stand rejected under 35 U.S.C. § 102(e) (the filing date of the above-referenced application precedes the publication date of Wu) for being drawn to subject matter which is allegedly anticipated by the subject matter described in U.S. Patent 6,400,007 to Wu et al. (hereinafter "Wu").

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single reference which qualifies as prior art under 35 U.S.C. § 102. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Wu describes stacked semiconductor device assemblies, as well as assembly methods. An assembly according to Wu, shown in FIG. 4 thereof, includes a substrate 26 and a first semiconductor die 28 secured to substrate 26 with glue 30, 50. *See also* col. 3, lines 15-18. A projecting element 52 on substrate 26 causes glue 50 to extend upwardly beyond an active surface 46 of first semiconductor die 28. Col. 3, lines 18-26. Wires 32 electrically connect bonding pads 48 of first semiconductor die 28 to corresponding signal input terminals 40 of substrate 26. Col. 3, lines 30-32. An element identified in FIGs. 3 and 4 of Wu as "54" is positioned on active surface 46 of first semiconductor die 28, between two rows of bonding pads 48. *See also* col. 3, lines 36-40. Element "54" appears to support a second semiconductor die 34, which is positioned over first semiconductor die 28. *Id.*

In assembling these components, glue 50 is applied to a surface of substrate 26, within the confines of projecting element 52. Col. 3, lines 18-26. A backside of first semiconductor die 28

is brought into contact with glue 50. Col. 3, lines 15-18. As first semiconductor die 28 is biased toward substrate 26, glue 50 oozes upwardly, around the peripheral edges of first semiconductor die 28, and onto peripheral portions of active surface 46 thereof. Col. 3, lines 18-26. Next, wires 32 are formed between bonding pads 48 of first semiconductor die 28 and corresponding signal input terminals 40 of substrate 26. Col. 3, lines 30-32. Thereafter, second semiconductor die 34 is positioned over first semiconductor die 28 and on element "54," which is apparently the "adhered glue **50**" mentioned at col. 3, lines 36-40.

Although Wu describes that wires 32 may be "pressed" by second semiconductor die 34, Wu does not include any express or inherent description that second semiconductor die 34 contacts, rests upon, or is "supported" by wires 32. In this regard, it should be noted that second semiconductor die 34 may indirectly "press" wires 32 and, thus, that such "pressing" may occur without second semiconductor die 34 actually contacting, resting upon, or being supported by wires 32.

It has also been asserted, at pages 2 and 3 of the Final Office Action, that FIG. 4 of Wu shows wires 32 supporting the second semiconductor die 34. FIG. 4 does not clearly depict any features between the first and second semiconductor dice 28 and 34. Moreover, the figures of Wu could not be considered to definitively show whether element 54, the adhered glue 50, the wires 32, or some combination thereof supports the second semiconductor die 34. Therefore, it cannot be conclusively stated that FIG. 4 shows wires 32 that support the second semiconductor die 34.

Independent claim 23, as amended and presented herein, is drawn to a method that includes, among other things, "positioning a second semiconductor device at least partially over [a] first semiconductor device [with] a back side of the second semiconductor device resting upon at least some . . . discrete conductive elements and being supported thereby."

The term "collectively" has been removed from independent claim 23, as it was apparently the source of some confusion. To clarify: the term "collectively," as used in independent claim 23, referred to the manner in which multiple discrete conductive elements

support a semiconductor device." In any event, it is respectfully submitted that the removal of "collectively" from independent claim 23 does not in any way limit the scope of that claim.

Independent claim 23 has also been amended to recite that the back side of a second semiconductor device *rests upon* discrete conductive elements, rather than merely contacting the discrete conductive elements.

It is respectfully submitted that Wu does not expressly or inherently describe that the second semiconductor die 34 thereof *rests upon* wires 32 as second semiconductor die 34 is being assembled with a first semiconductor die 28. In fact, Wu does not provide any other details of positioning second semiconductor die 34 over first semiconductor die 28 than: "upper semiconductor chip **34** is stacked above lower semiconductor chip **28** by adhered glue **50** . . ." Col. 3, lines 36-40. It is also respectfully submitted that second semiconductor die 34 may indirectly "press" wires 32 and, thus, need not rest upon wires 32 or be supported thereby. As such, it is respectfully submitted that Wu does not expressly or inherently describe positioning a second semiconductor device such that it *rests upon* discrete conductive elements that extend at least partially over the surface of an underlying first semiconductor device, as required by amended independent claim 23.

Additionally, it is respectfully submitted that Wu does not expressly describe that wires 32 support second semiconductor die 34. Instead, Wu explains that the adhered glue 50 stacks the second semiconductor die 34. Col. 2, lines 42-46; col. 3, lines 36-40. Wu also shows, in FIGs. 3 and 4, element 54 between first semiconductor die 28 and second semiconductor die 34.

Moreover, without wires 32, adhered glue 50 and element 54 would, either alone or together, support the second semiconductor die 34. Therefore, wires 32 are not needed to support second semiconductor die 34. Thus, Wu lacks any inherent description that the wires 32 support the second semiconductor die 34.

Therefore, Wu does not anticipate each and every element of amended independent claim 23 under 35 U.S.C. § 102(e). As such, it is respectfully submitted that, under 35 U.S.C. § 102(e), amended independent claim 23 recites subject matter which is allowable over the subject matter described in Wu.

Claims 24, 29, 30, 33, and 40 are each allowable, among other reasons, for depending either directly or indirectly from claim 23, which is allowable.

Claim 24 is further allowable because Wu lacks any express or inherent description of positioning a second semiconductor die 34 over wires 32 with a back side of the semiconductor die 34 and wires 32 "in mutual electrical isolation." Instead, the disclosure of Wu is focused on preventing short circuiting between wires 32 and an active surface of the first semiconductor die 28, over which wires 32 extend.

Claim 30 is additionally allowable since Wu does not expressly or inherently describe "drawing" second semiconductor die 34 thereof toward first semiconductor die 28. Instead, the teachings of Wu are limited to "stack[ing]" second semiconductor die 34 above first semiconductor die 28.

Claim 33 is also allowable since Wu includes no express or inherent description that a quantity of adhesive material (adhered glue 50 or element 54) is applied to an active surface of first semiconductor die 28 "after . . . positioning the second semiconductor" die 34 thereover.

Independent claim 45 is drawn to a method for assembling semiconductor devices in stacked arrangement. The method of independent claim 45, as amended and presented herein, includes, among other things, "positioning a second semiconductor device at least partially over [a] first semiconductor device and <u>on</u> at least some discrete conductive elements . . . such that the second semiconductor device is supported by the at least some discrete conductive elements . . ." (emphasis supplied). Additionally, independent claim 45 recites that "the back side and . . . [the] discrete conductive elements" that support the back side "are electrically isolated from each other."

The term "collectively" has been removed from independent claim 45, as it was apparently the source of some confusion. To clarify: the term "collectively," as used in independent claim 45, referred to the manner in which multiple discrete conductive elements support a semiconductor device." In any event, it is respectfully submitted that the removal of "collectively" from independent claim 45 does not in any way limit the scope of that claim.

Again, Wu does not expressly or inherently describe that the second semiconductor die 34 thereof may be positioned on or supported by wires 32.

Therefore, it is respectfully submitted that Wu does not anticipate each and every element of amended independent claim 45. Thus, under 35 U.S.C. § 102(e), amended independent claim 45 recites subject matter which is allowable over that described in Wu.

Each of claims 46, 49, 50, 53, 59, and 61-64 is allowable, among other reasons, for depending either directly or indirectly from claim 45, which is allowable.

Claim 50 is further allowable since Wu lacks any express or inherent description of "drawing" second semiconductor die 34 thereof toward first semiconductor die 28. Instead, the description of Wu is limited to "stack[ing]" second semiconductor die 34 above first semiconductor die 28.

Claim 53 is also allowable since Wu does not expressly or inherently describe that a quantity of adhesive material (element 54) is applied to an active surface of first semiconductor die 28 "after . . . positioning the second semiconductor" die 34 thereover.

In view of the foregoing, it is respectfully requested that the 35 U.S.C. § 102(e) rejections of claims 23, 24, 29, 30, 33, 40, 45, 46, 49, 50, 53, 59, and 61-64 be withdrawn.

Rejections Under 35 U.S.C. § 103(a)

Claims 25-27, 31, 32, 34, 35, 41-44, 47, 48, 51, 54-58, and 60 stand rejected under 35 U.S.C. § 103(a).

The standard for establishing and maintaining a rejection under 35 U.S.C. § 103(a) is set forth in M.P.E.P. § 706.02(j), which provides:

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both

be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Wu in View of Lee

Claims 25, 26, 31, 34, 35, 41-44, 47, 51, 54-58, and 60 have been rejected under 35 U.S.C. § 103(a) for reciting subject matter which is purportedly unpatentable over the subject matter taught in Wu, in view of teachings from U.S. Patent 6,388,313 to Lee et al. (hereinafter "Lee").

The teachings of Wu have been summarized above.

Lee teaches a process for forming a multi-chip module. That process includes, among other things, securing a first semiconductor chip 21 to a substrate 20. FIG. 1; col. 5, lines 5-7. Bond pads 210 of first semiconductor chip 21 are electrically connected to corresponding terminals (not shown) of substrate 20 by bond wires 22. FIG. 1; col. 5, lines 7-10. A so-called "reverse wire-bonding technique" is employed so as to minimize the distance that bond wires 22 protrude above the active surface of first semiconductor chip 21. Col. 5, lines 10-21. Next, an electrically insulative adhesive layer 23 is applied over first semiconductor chip 21. FIG. 1; col. 5, lines 22-25. The adhesive layer completely surrounds bond wires 22 (FIG. 1; col. 5, lines 25-32) in such a way as to prevent the bond wires 22 from contacting the nonactive surface of a second semiconductor chip 24 (col. 3, lines 37-42). The second semiconductor chip 24 is then positioned over first semiconductor chip 21 and secured thereto by way of adhesive layer 23. *Id.*

Claims 25, 26, 31, 34, 35, and 41-44 are each allowable, among other reasons, for depending indirectly from claim 23, which is allowable.

Claim 31 is additionally allowable since Wu and Lee both lack any teaching or suggestion that the adhesive materials or resins disclosed therein are capable of drawing two semiconductor devices toward one another "by at least one of capillary action . . ., curing . . ., application of heat . . . , and vibration."

Claim 34 is further allowable because neither Wu nor Lee teaches or suggests that two semiconductor device may be drawn toward one another.

Claim 35, which depends from claim 34, is also allowable since Wu and Lee do not teach or suggest that curing of a glue, resin, or other adhesive material may cause two semiconductor devices to be drawn toward one another.

Each of claims 47, 51, 54-58, and 60 is allowable, among other reasons, for depending indirectly from claim 45, which is allowable.

Claim 51 is additionally allowable since both Wu and Lee lack any teaching or suggestion that the adhesive materials or resins disclosed therein are capable of drawing two semiconductor devices toward one another "by at least one of capillary action . . ., curing . . ., application of heat . . . , and vibration."

Claim 54 is further allowable because neither Wu nor Lee teaches or suggests that two semiconductor device may be drawn toward one another.

Claim 55, which depends from claim 54, is also allowable since Wu and Lee do not teach or suggest that curing of a glue, resin, or other adhesive material may cause two semiconductor devices to be drawn toward one another.

Claim 57 is additionally allowable because Wu and Lee both lack any teaching or suggestion of controlling biasing of one semiconductor device toward another.

Claim 58 is also allowable since neither Wu nor Lee includes any teaching or suggestion of "controlling biasing force to a level insufficient to deform, kink, bend, or collapse . . . discrete conductive elements." Wu actually teaches away from the subject matter recited in claim 58 by teaching the use of a projecting element 52 and overflow glue 58 to prevent shorting of wires 32 against first semiconductor die 28 as second semiconductor die 34 presses wires 32. Col. 3, lines 50-62.

Claims 25, 26, 31, 34, 35, 41-44, 47, 51, 54-58, and 60 are further allowable because one of ordinary skill in the art would not have been motivated to combine the teachings of Wu and Lee in the manner that has been asserted. In particular, as neither Wu nor Lee teaches or suggests that a back side of an upper semiconductor device may be supported by bond wires or other intermediate conductive elements extending over the active surface of a lower, adjacent

semiconductor device. In view of this deficiency, it appears that the only source for such motivation would have been the disclosure provided by the above-referenced application.

It is further submitted that one of ordinary skill in the art would have had no reason to expect the asserted combination of teachings from Wu and Lee to be successful. Again, as neither of these references teaches or suggests that bond wires may support an upper semiconductor device, there would be no reason for one of ordinary skill in the art to expect that teachings from Wu and Lee could be combined in such a way as to render the subject matter of any of claims 25, 26, 31, 34, 35, 41-44, 47, 51, 54-58, and 60 obvious under 35 U.S.C. § 103(a).

Further, by teaching the undesirability of "contact[ing] and press[ing] the wirings of the lower semiconductor chip" (Wu, col. 1, lines 16-18), Wu teaches away from supporting a semiconductor device upon bond wires or other intermediate conductive elements.

Wu in View of Shim

Claims 27, 32, and 48 are rejected under 35 U.S.C. § 103(a) for being directed to subject matter that is assertedly unpatentable over the teachings of Wu, in view of teachings from U.S. Patent 6,531,784 to Shim et al. (hereinafter "Shim").

Claims 27 and 32 are both allowable, among other reasons, for depending indirectly from claim 23, which is allowable.

Claim 48 is allowable, among other reasons, for depending indirectly from claim 45, which is allowable.

In view of the foregoing, withdrawal of the 35 U.S.C. § 103(a) rejections of claims 25-27, 31, 32, 34, 35, 41-44, 47, 48, 51, 54-58, and 60 is respectfully requested.

ELECTION OF SPECIES REQUIREMENT

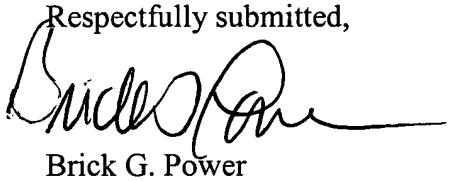
It is respectfully submitted that independent claims 23-27, 29-32, 45-51, 56-58, 63, and 64 remain generic to all of the species of invention that were identified in the Election of Species Requirement of August 1, 2002, in the above-referenced application. In view of the

allowability of these claims, claims 36-39 and 52, which have been withdrawn from consideration, should also be considered and allowed. M.P.E.P. § 806.04(d).

CONCLUSION

It is respectfully submitted that each of claims 23-27 and 29-64 is allowable. An early notice of the allowability of each of these claims is respectfully solicited, as is an indication that the above-referenced application has been passed for issuance. If any issues preventing allowance of the above-referenced application remain which might be resolved by way of a telephone conference, the Office is kindly invited to contact the undersigned attorney.

Respectfully submitted,



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